

allied than our primordial hippoids are with their descendants. Yet, according to existing arrangements, the ancestors would have to be placed in one order of the class of mammalia and their descendants in another. It may be suggested that it might be as well to wait until the primordial hippoid is discovered before discussing the difficulties which will be created by its appearance. But the truth is that that problem is already pressing in another shape. Numerous "lemurs," with marked ungulate characters, are being discovered in the older Tertiaries of the United States and elsewhere; and no one can study the more ancient mammals with which we are already acquainted without being constantly struck with the insectivorous characters which they present. In fact, there is nothing in the definition of either Primates, Carnivores, or Ungulates, which affords any means of deciding whether a given fossil skeleton, with skull, teeth, and limbs almost complete, ought to be ranged with the Lemurs, the Insectivores, the Carnivores, or the Ungulates.

In whatever order of mammals a sufficiently long series of forms has come to light they illustrate the three-fold law of evolution as clearly, though perhaps not so strikingly, as the equine series does. Carnivores, Artiodactyles, and Persso-sodactyles all tend, as we trace them back through the Tertiary epoch, towards less modified forms which will fit into none of the recognised orders, but come closer to the Insectivora than to any other. It would, however, be most inconvenient and misleading to term these primordial forms Insectivora, the mammals so-called being themselves more or less specialised modifications of the same common type, and only, in a partial and limited sense, representatives of that type. The root of the matter appears to me to be that the palæontological facts which have come to light in the course of the last ten or fifteen years have completely broken down existing taxonomical conceptions, and that the attempts to construct fresh classifications upon the old model are necessarily futile. The Cuvierian method, which all modern classifiers have followed, has been of immense value in leading to the close investigation and the clear statement of the anatomical characters of animals. But its principle, the association into sharp logical categories defined by such characters, was sapped when Von Baer showed that, in estimating the likenesses and unlikenesses of animals, development must be fully taken into account; and if the importance of individual development is admitted, that of ancestral development necessarily follows. If the end of all zoological classification is a clear and concise expression of the morphological resemblances and differences of animals, then all such resemblances must have a taxonomic value. But they fall under three heads: (1) those of adult individuals; (2) those of successive stages of embryological development or individual evolution; (3) those of successive stages of the evolution of the species, or ancestral evolution. An arrangement is "natural," that is, logically justifiable, exactly in so far as it expresses the relations of likenesses and unlikenesses enumerated under these heads. Hence, in attempting to classify the Mammalia, we must take into account not only their adult and embryogenetic characters, but their morphological relations, in so far as the several forms represent different stages of evolution. And thus, just as the persistent antagonism of Cuvier and his school to the essence of Lamarck's teachings (imperfect and objectionable as these often were in their accidents) turns out to have been a reactionary mistake, so Cuvier's no less definite repudiation of the principle of Bonnet's "*échelle des êtres*" was no less unfortunate. The existence of a "scala animantium," is a necessary consequence of the doctrine of evolution, and its establishment constitutes, I believe, the foundation of scientific taxonomy. Many years ago, in my lectures at the Royal College of Surgeons, I particularly insisted on the central position of the Insectivora among

the higher Mammalia; and further study of this order and of the Rodentia has only strengthened my conviction that any one who is acquainted with the range of variation of structure in these groups possesses the key to every peculiarity which is met with in the Primates, the Carnivora, and the Ungulata. Given the common plan of the Insectivora and of the Rodentia, and granting that the modifications of the structure of the limbs, of the brain, and of the alimentary and reproductive viscera which occur among them may exist and accumulate elsewhere, and the derivation of all Eutheria from animals which, except for their diffuse placentation, would be Insectivores, is a simple deduction from the law of evolution. I venture to express a confident expectation that investigation into the mammalian fauna of the Mesozoic epoch will, sooner or later, fill up the blanks which at present exist in the "scala mammalium." Prof. Huxley proceeded to give details on which his conclusions were based, and dwelt on the fact that much further careful work is needed to clear up problems before us.

### NOTES

WE are enabled through the courtesy of the Council of the Royal Society of Edinburgh to present our readers with an abstract of a remarkable paper by Mr. John Aitken, on Dust, Fog and Mist. The paper opens up new lines of inquiry, and indeed a new future, to what has hitherto been one of the most difficult branches of meteorology, viz. the investigation of the vapour of the atmosphere, which we may safely predict meteorologists will not be slow in following up. Mr. Aitken continues the prosecution of the inquiry, and we learn that last week he has experimented with temperatures as low as 14° F. with the result that equal ly as at higher temperatures, there is no cloudy condensation when there is no dust; but, when there is dust, cloudy condensation takes place on the dust nuclei, the amount of cloudiness being of course relatively small at such low temperatures on account of the small amount of vapour present. Taken along with Prof. Lister's experiments, in which it was shown that a single drop of rain developed organisms in sensitive solutions which would otherwise have remained for months unaltered, it shows that germ-producing matter, or germs themselves, form at least a part of the cloud- and fog-producing dust. Hence a cotton-wool respirator may prove a protection against disease. We have said enough to show that the paper is one of interest, not only to the physicist and the meteorologist, but also (and perhaps even specially) to the physiologist and the sanitarian.

WE are pleased to learn that Dr. W. De La Rue, F.R.S., has been chosen a Corresponding Member of the Paris Academy of Sciences in the Section of Astronomy.

BARON DE CHAUDOIR, Mr. McLachlan, and Baron C. R. Osten-Sacken have been elected honorary members of the Entomological Society of Belgium, filling the vacancies in the list caused by the deaths of Dr. Boisduval, M. Mulsant, and Dr. Snellen van Vollenhoven.

It is proposed to hold a meeting of the Association for the Improvement of Geometrical Teaching on Friday, January 7, in the Botanical Theatre of University College, Gower Street, at 11 a.m. The sub-committees appointed January 11, 1878, have prepared, and circulated amongst the members, draft syllabuses of solid geometry, higher plane geometry, and geometrical conics, and will present their Reports at the meeting. All persons interested in the elementary teaching of geometry are invited to attend.

ACCORDING to a resolution of the St. Petersburg Society of Naturalists, the work of Prof. Wagner on "Medusæ and

Hydroids of the White Sea," will be published in German and French, with fifty tables of engravings.

THE Peabody Academy of Science (Salem, Massachusetts, U.S.A.), after a forced suspension of its publications for six years, announces that the *Memoirs* will be resumed at an early date.

DR. HOEK of Leiden writes us that a first part of the Zoological Results of the Dutch Arctic Cruises with the 60-ton Schooner *Willem Barents* will shortly be published. These results—a preliminary report of which Mr. D'Urban has given in the October number of the *Ann. and Mag. of Nat. Hist.*—will be published as an extra volume of the *Niederländisches Archiv. für Zoologie* (Leiden, E. T. Brill). The different articles will be written in English, French, or German, and the distribution of the material has been as follows:—Sponges, Dr. G. C. J. Vosmaer; Echinoderms, Prof. C. K. Hoffmann; Hydroids and Polyzoa, Dr. W. J. Vigelius; Nemertineans, Dr. A. A. W. Hubrecht; other Worms, Dr. R. Horst; Pycnogonids and Crustaceans, Dr. P. P. C. Hoek; Lamellibranchiate Mollusks, Mr. D. van Haren Noman; Gastropodous Mollusks, Mr. Th. W. van Lidth de Jeude; Fishes, Dr. A. A. W. Hubrecht; Birds, Prof. H. Schlegel. The first part contains the Worms, the Pycnogonids, the Lamellibranchiate Mollusks, the Fishes, and a description of the only mammal captured, and will be issued before the end of January.

THE death is announced of Prof. Karl B. Heller of the K.K. Theresianum at Vienna, a naturalist well known by his numerous writings.

REPORTS from Honolulu describe an eruption of the Mauna Loa Volcano (Hawaii) as the grandest which has ever been observed. It began on November 5 at some nine kilometres distance from the summit of the crater. The eruption of lava was accompanied by terrible explosions.

EARTHQUAKES are reported (1) from Brescia, where a shock was observed on December 10 in the afternoon; (2) from Schloss Trakostyan and environs (in the mountains of Northern Croatia), where three violent shocks occurred in the night of December 10-11; (3) from Smyrna, where, on December 12 at 9.40 p.m., a tolerably powerful shock was noticed. On the 23rd inst., about 5 p.m., a shock of earthquake was felt at Bucharest, Rustchuk, Kustendje, Galatz, Berlad, and Jassy. In the night of December 16-17 two earthquake shocks were felt in Agram, in close succession, about 11 p.m. About the same hour shocks were observed in various parts of Carniola and Styria, e.g. in Gurkfeld at 11.4 and 11.9 p.m., in Grossontag, near Friedau, three quickly-successive shocks; in Pragerhof two pretty sharp shocks; in Peltau and in Marburg one strong shock each. In Csakathum (Hungary) and neighbourhood strong earthquake motions were likewise observed the same night about 11.20 p.m. In the night of December 21-22 shocks were again felt in Agram, of which one about 1 a.m. was pretty violent. In the environs of Agram slight earth-vibrations are still constantly being experienced. At about ten minutes past five o'clock p.m. on December 25 two rather severe shocks of earthquake occurred at Odessa within a very short interval of each other. They appear to have come from the direction of the Middle Danube, and, passing through Roumania and Bessarabia, spent themselves here on the shores of the Black Sea in South Russia. They seem to have been most strongly felt at the Bessarabian towns of Bielez, Kishineff, and Tiraspol, for the walls of some of the houses were cracked in consequence. At Odessa the effects were limited to buildings and furniture being more or less roughly shaken, or light articles such as vases, bottles, and glasses, being thrown down. The weather was extremely mild and calm at the time, and the sky but very partially clouded.

FALB'S theory is gaining in favour with the population, especially as he predicted fresh earthquakes in the Agram region from December 15 to 31. Falb has enunciated his theory in a newly-published popular work entitled "Die Umwälzungen im Weltall" (Revolutions in the Universe). These are treated under three heads: (1) in the star regions; (2) in the region of clouds; and (3) in the depths of the earth.

THE tomb of Immanuel Kant at Königsberg will soon be decorated in a worthy manner. Upon a suitable pedestal a marble bust of the great philosopher will be placed. The bust is the work of Prof. Siemering.

"ALLERLEI gesammelte ornithologische Beobachtungen" is the title of a new book from the pen of Rudolf, Crown Prince of Austria, just published in a limited number of copies, which have been presented by the author to his friends.

A MONUMENT of the celebrated ornithologist Naumann was recently unveiled in the Schlossgarten at Köthen upon the occasion of the centenary of Naumann's birth.

THE German Fisheries Union have, according to the proposal of Prof. Nitsche of Tharand, resolved to offer a prize of 500 marks (25*l.*) for the best treatise on the following subject:—Of the ova of fish which are sown out for breeding, and particularly of the ova of the Salmonidæ, a large percentage is completely destroyed by fungi, well-known to pisciculturists as byssus or "mould," and belonging partly to the family of Schizomycetæ and partly to that of Saprolegniaceæ. A detailed botanical description of the respective genera and species, their biology and propagation, as well as an account of the manner of their introduction into the piscicultural apparatus, of the conditions which favour their development and of the way in which they destroy the ovum, is now required. At the same time the questions are to be discussed whether and by what means it would be possible to prevent their introduction, and what measures would best stop a continued spreading of the evil when once introduced into a breeding place. The treatises are to be sent, under the usual formalities, to the office of the German Fisheries Union, 9, Leipziger Platz, Berlin. The competition for the prize is to be an international one, and the treatises may be written in German, English, or French. The final term is October 1, 1882.

WE have received specimens of the diaries published by Messrs. De La Rue. While their beauty and convenience commend them to everybody, they ought to be of special value to lovers of science, as they contain so many scientific data. Their get-up and general utility are beyond praise.

THE *Comptes rendus* of the Paris Academy of Sciences for December 20 is entirely occupied with the discourses pronounced at the funeral of M. Michel Chasles by representatives of the various bodies with which the deceased member was connected—MM. J. Bertrand, Bouquet, Laussedat, Dumas, and Rolland.

AT the last meeting of the St. Petersburg Society of Gardening M. Grigorjeff made an interesting communication on Japanese gardens. The Japanese are most passionate lovers of gardening, which is carried on by all classes of society, from the great palaces to the most humble houses. Gardening, as well as the art of making bouquets, is taught in schools, and nowhere else in Europe are there so many gardens as in Japan. The species cultivated in the small private gardens are mostly miniature representatives of great trees. All new species and varieties of garden flowers and trees are sold at high prices and become known throughout the country with great rapidity. M. Grigorjeff exhibited during his lecture a most interesting collection of photographs of Japanese gardens.

THE Russian scientific bodies continue to express their sympathy with Prof. Mendeleeff on the occasion of the refusal



by the Academy of Sciences to admit him as Member of that body. The Russian Chemical and Physical Society, while electing him Honorary Member, has presented him with an address in which it is stated that the Society considers him "to be a chemist who has no equal among Russian chemists." Many scientific bodies, as the University of Kieff, the Society of Hygiene, &c., have elected him Honorary Member or President. A public subscription has been opened for the institution of a prize bearing his name, and a great dinner was given in his honour by the St. Petersburg *savants*, among whom we notice the most eminent Russian Members of the Academy of Sciences. It is worthy of notice that Professors Korkin and Setchenoff, as well as the late M. Hilferding, the Panslavist explorer of Slavonian literature, met at the hands of the Academy of Sciences the same fate as M. Mendeleeff.

THE law for the isolation of the French National Library has been adopted by both Houses of the French Parliament, and the necessary expropriation for the great work will begin immediately.

AT a recent sitting the Municipal Council of Paris voted a sum of 400*l.* for the establishment of a School of Chemistry. It will be opened free to the pupils of the several Municipal schools who are desirous of practice in chemical industries.

THE French Government is to establish in Egypt a school of Egyptology, which will be directed by M. Maspero, now Professor of Egyptology to the College of France. This creation will be the third school established abroad at the expense of the French Budget. The two others are one at Rome and the other at Athens.

THE Thirteenth Annual Report of the Eastbourne Natural History Society testifies to the Society's continued prosperity. At the meeting of November 19 Dr. Royston Pigott read an interesting paper on "The Limits of Human Vision."

THE *Proceedings* of the Belfast Natural History and Philosophical Society for 1878-80 contains, besides several general papers, a few natural history papers of local interest, including one (with illustrations) on Irish Spiders, by Mr. Thomas Workman.

A BALNEOLOGICAL and a patent-protection exhibition will be held at Frankfort-on-the-Main in 1881.

### OUR ASTRONOMICAL COLUMN

**VARIABLE STARS.**—Amongst the stars which, from a comparison of the various catalogues, exhibit more or less strongly signs of variability, may be mentioned the following, which we take in order of right ascension; the positions are for the year 1880:—

1. Lalande 2037-8. R.A. 1h. 3m. 24*s.*, N.P.D. 38° 30' 5". On September 29, 1790, Lalande rated this star 10*m.*, and on December 27 following, 8'9; the B.D. (by which letters we refer to the Bonn *Durchmusterung*) has 7'0. Harding marks it a ninth.

2. 40 Cassiopeæ. R.A. 1h. 28m. 57*s.*, N.P.D. 12° 41' 17". In Argelander's zone No. 167 on January 1*m.*, 1843, it was estimated 7, yet in the B.D. it is 5'2. In the first Radcliffe catalogue, where great attention was given to the magnitudes, it is 4'7; Piazzi has 6, Groombridge 5'6, and Heis the same.

3. Lalande 4864-5. R.A. 2h. 32m. 15*s.*, N.P.D. 40° 57' 4". Estimated 9 in September, 1790, and 7½ in January following; but it has since been discerned with the naked eye, Heis calling it 6'7. The B.D. has 6'7. It is not in Houzeau.

4. Bradley 396. R.A. 2h. 53m. 13*s.*, N.P.D. 8° 59' 8". Lalande rated this star 4'5 in November, 1789, and 7 in March, 1790. Groombridge, who made six observations for position, estimated it 7, Heis and Carrington 6, while it is 5'5 in the B.D.

5. 35 Camelopardi. We have already referred to the marked

discordances in the estimates of the magnitude of this star in the various catalogues. Dembowski has directed attention to the probable variability of the principal component, and the star certainly deserves more regular attention at the hands of observers than it has yet received. R.A. 5h. 54m. 58*s.*, N.P.D. 38° 25' 5". The estimated magnitudes vary from 5'5 to 8.

6. Attention may be once more directed to the star which Rümker compared with Encke's comet at Paramatta, N.S.W., on June 19, 1822, and which he rated at the time 4'5. Whether it really attains this degree of brightness is not yet certain; it is however 6'0 in the *Uranometria Argentina*, and was observed as low as 8*m.* in 1873. The B.D. says 6'5. Its light is a full yellow. R.A. 7h. 23m. 15*s.*, N.P.D. 91° 39' 5".

7. 65  $\beta^2$  Geminorum. R.A. 7h. 22m. 21*s.*, N.P.D. 61° 50' 3". Lalande rated this star as low as 8½ in March, 1794, but calls it 5½ in February following. Bessel estimated it 7; all other observers say 5 or 5'6.

8. 16 Leonis Minoris. R.A. 9h. 42m. 51*s.*, N.P.D. 49° 48' 7". D'Agelet has 5 and 7'8, Lalande 6½, Piazzi 8, the first Radcliffe Catalogue 6'6, Bessel, Taylor, and the B.D. 7, Houzeau 5'6, but neither Argelander nor Heis included it amongst the stars visible to the naked eye.

9. Lalande 19034. R.A. 9h. 34m. 49*s.*, N.P.D. 113° 2' 7". It appears strange that a star isolated as this is should not have been more frequently observed on the meridian, if always as bright as say 5*m.* D'Agelet and Piazzi have not got it; Lalande calls it 4½ on March 21, 1797; Argelander has 6 on March 6, 1850, 4 on February 16, 1851, and 5 on March 8, 1852; Heis and Houzeau call it 5, and Gould 5'2.

If we may rely upon the observations of Kirch early in the last century there would appear to be sensible changes in the relative brightness of  $\beta$  and  $\delta$  Scorpii; on January 17, 1704, he writes: " $\beta$  und  $\delta$  erschienen fast im gleicher Grosse, jedoch  $\delta$  ein wenig heller (ietzt ist  $\beta$  2,  $\delta$  3 grösse)," while on April 1 following he records " $\delta$  merklich grösser als  $\beta$ ." Argelander and Heis estimate  $\beta$  and  $\delta$  respectively 2 and 2'3; Gould has no sensible difference.

10. Lalande 38405. R.A. 20h. 0*m.* 16*s.*, N.P.D. 94° 45' 4". This star was rated 6 on July 15, 1794, 7 on August 15, 8 on August 20, and 7½ on August 30 of the following year. It is 8 in Bessel, 7 in Wolfer's map, one of the series of the Berlin Academy, and 6'7 in Heis and Houzeau. Gould does not give it. It might be inferred from Lalande's observations that the period is not very long.

11. 33 Capricorni. Chacornac says of this star: "Observée tantôt plus brillante, tantôt moins qu'une étoile de 7<sup>me</sup> grandeur dont elle est voisine:" the seventh magnitude alluded to being, it may be presumed, O.A. 21386, which follows 2*m.* 12*s.*, 9'4 to the south. 33 Capricorni is 5'6 in Argelander, 6'5 in Heis and Behrmann, and 5'7 in Gould; it is one of Chacornac's red stars, Gould also calls it red. The evidence of variability in this case seems to rest with Chacornac. R.A. 21h. 17m. 21*s.*, N.P.D. 111° 21' 5".

12. 17 Andromedæ, a star previously noted in this column as variable. In the "British Catalogue" it is rated 4; Bradley and Piazzi call it 7; Lalande's three estimates are 5, 5 and 4; D'Agelet has 3'4 and 6; the first Radcliffe catalogue 3'9, and the B.D. 4'2; estimates from 4 to 7 are therefore sufficiently confirmed: the variation may be slow, but the star certainly deserves attention. R.A. 23h. 32m. 15*s.*, N.P.D. 47° 24' 1".

**THE COMET 1873 VII.**—The comet discovered by Coggia at Marseilles on November 10 and by Winnecke on November 11 was soon lost in Europe from its rapid southerly motion; indeed the observations extend over less than a week. The elements exhibited a similarity to those which had been assigned to a comet detected by Pons in February, 1818, but very imperfectly observed, and Prof. Weiss, the present director of the Imperial Observatory at Vienna, was at the trouble of examining the question of possible identity as closely as the data permitted. He formed three normal positions from the small number of observations—for November 11, 13, and 15—and under the condition that the first and third normals should be exactly represented he ascertained how the second one was represented on the assumption (1) that the orbit was parabolic; (2) that the period of revolution corresponded to the interval between the perihelion-passages in 1818 and 1873, or 55'82 years; and (3) that the comet had completed eight revolutions in this interval, or that the period extends only to 6'977 years. As a matter of figures the agreement was found to be slightly closer for hypothesis (3) than for the other two, the parabola showing the largest differ-